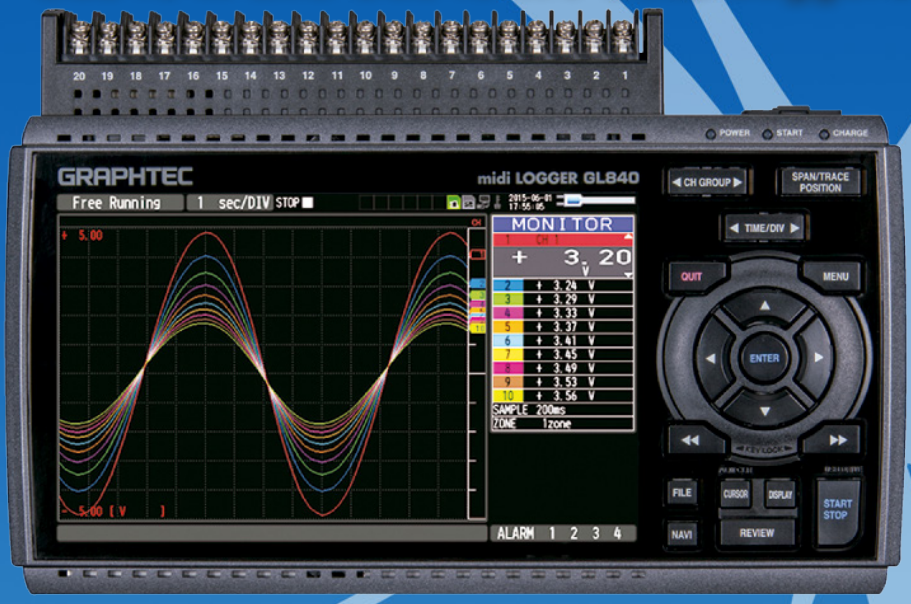
GL840-M and GL840-WV Data Loggers



- ✓ 20 analog input channels, expandable to 200
  - ✓ Programmable per channel
  - ✓ ±20 mV to ±100 V over 12 ranges
  - ✓ Supports direct-connected thermocouples of any type
  - ✓ Supports direct-connected PT100/PT1000 RTDs
  - ✓ Full isolation per channel (60 V GL840-M; 300 V GL840-WV)
- ✓ 4 discrete input channels
  - ✓ Programmable as a group as logic or pulse inputs
  - ✓ Pulse inputs support counter or frequency inputs
- ✓ 4 discrete alarm outputs
- ✓ Optional WiFi wireless operation
- ✓ Flexible triggering
- ✓ Built-in, 7-inch color display
- ✓ Built-in Web server operation for remote operations
- ✓ Removable SD memory support up to 32 GB capacity
- ✓ Operates either stand-alone or PC-connected.
- ✓ PC-side software included

GL840 Description

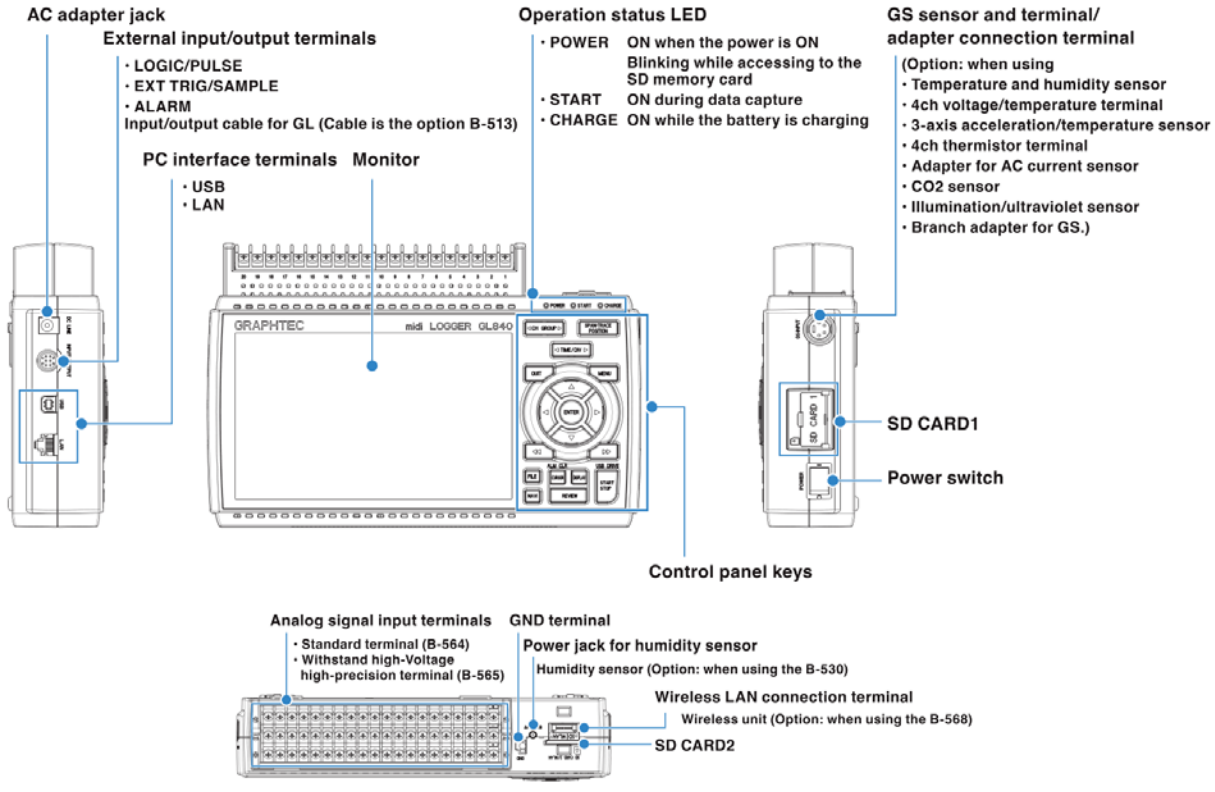
Model GL840 Series is a third-generation data logger product with exceptional price/performance. It's a 20 analog channel device expandable to 200 channels, augmented by four discrete inputs and outputs. Its discrete inputs can be configured as a group to be either logic inputs or pulse inputs. When configured for pulse, each of the four channels can be configured to measure frequency or to count. The four discrete outputs are alarms that can be triggered by a variety of easily-defined analog and pulse/discrete input channel conditions. The 20 GL840 analog input channels may each be configured to measure a direct connected voltage in the range of 20 mV to 100 V full scale across 12 ranges, a direct-connected thermocouple of any type, or a 3-wire PT100 or PT1000 RTD. Each of the GL840's analog input channels is electrically isolated from other channels and from power ground allowing off-ground measurements using shunts, as well as powered or grounded thermocouples. Further, two GL840 versions are available to tolerate up to a 60 or 300 Vp-p common mode voltage. Model GL840-M supports up to 60 Vp-p common mode. Model GL840-WV supports up to 300 Vp-p common mode to address more aggressive applications, like stacked battery cell measurements for both temperature and voltage.

The most powerful GL840 feature is its triggering flexibility. Data recording can be independently started or stopped as a function of analog and pulse/discrete signal level (single or windowed), alarm, date and time, and day-of-the-week. Triggers can also be configured to operate only once, or to automatically repeat. The ability of the GL840 to adapt to virtually any desired trigger condition allows the instrument to operate unattended for long periods of time with complete autonomy.

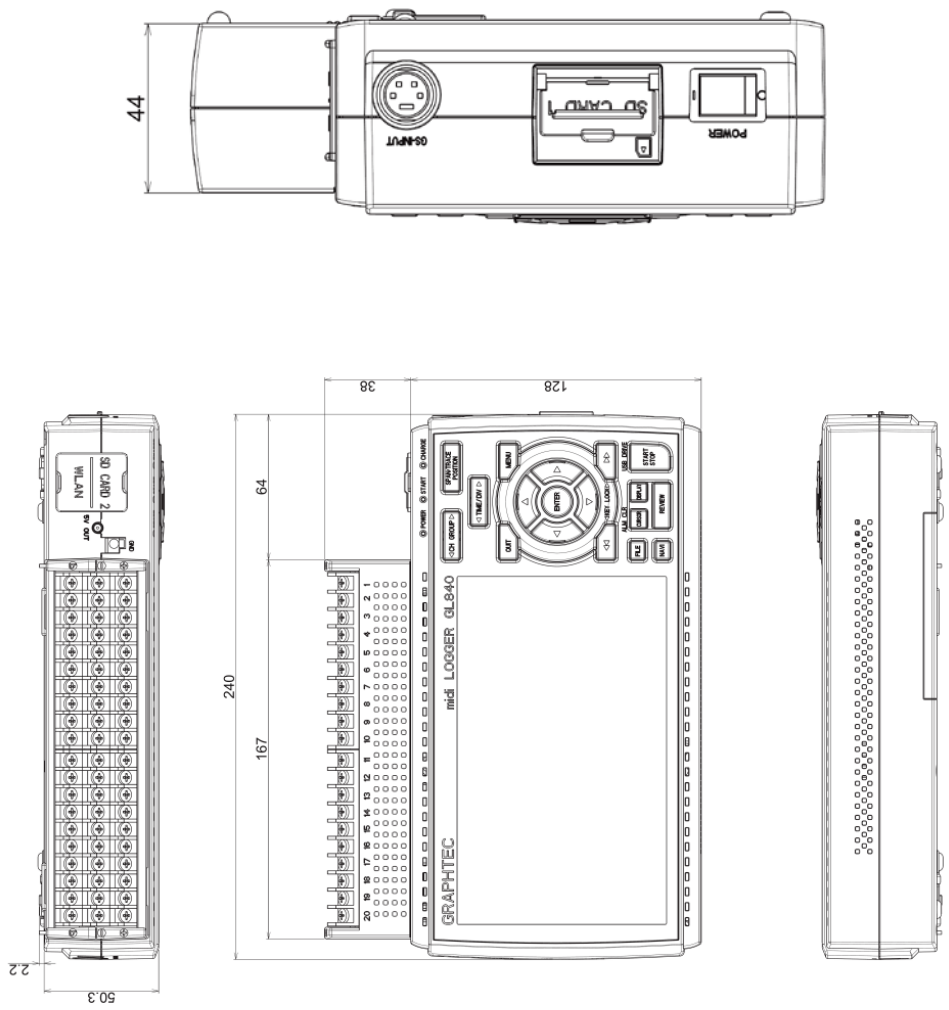
The GL840 operates either connected to a PC or entirely stand-alone. Connection to a PC may be over a standard Ethernet, USB, or optional wireless connection. Each connection approach may take advantage of supplied PC-side software to configure, acquire, display, and record digitized information for storage directly to the PC's HDD. Acquired data may be retrieved for review and analysis after recording, including the ability to export to Microsoft Excel. Using the GL840's built-in Ethernet port or wireless option enables the instrument's networking features, allowing it to be remotely configured and managed using the standard Web browser of any computer or smart phone. Automatic backup of data acquired to a user-accessible SD memory card is also supported via its FTP facility.

Finally, the measurement reach of the GL840 is further extended by use of GS Sensor accessories that can be either connected directly to the GL840 or wirelessly accessed with the B-568 wireless option using the GL100-WL. Extended measurements of temperature/humidity, acceleration, CO2, illuminance, ac current, and more are available using GS Sensors.

GL840 Close Up



GL840 External Dimensions

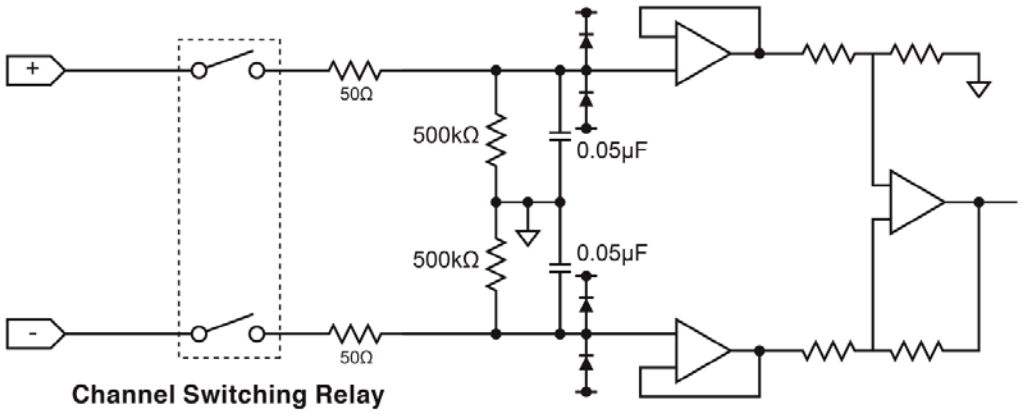


Dimension: mm
Precision: ±5 mm

GL840 Analog Input Circuit and Measurement Ranges

Each of the twenty GL840 analog input channels offers isolation between them and ground. That means that a potential difference in the ground of one or more channels relative to each other, or relative to the power ground of the GL840 have little or no effect on measurements when used within spec. The isolation feature provides a tremendous advantage in terms of noise immunity while making typical measurements, and extends the reach of the instrument to include those that can only be made with an isolated configuration, like current shunts and powered and grounded thermocouples.

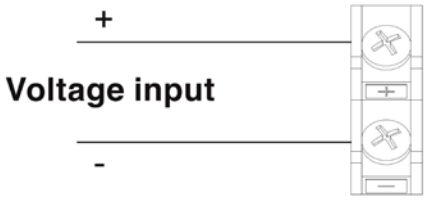
Analog Input Channel Circuit Diagram (typical per channel)



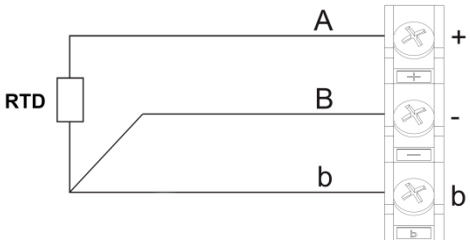
Analog Connections and Measurement Range (typical per channel)

Item	Description
Input configuration	Isolated input, scanning
Measurement range	20, 50, 100, 200, 500 mV/F.S.; 1, 2, 5, 10, 20, 50, 100 V/F.S.; 1-5V
Thermocouples	K, J, E, T, R, S, B, N, W (WRe 5-26)
RTDs	PT100/PT1000 (3-wire)
A/D resolution	16-bit (Effective resolution: Approx. 1/40,000 of the +/- range)
Filter	Off, 2, 5, 10, 20, 40 Filter operation is on a moving average basis. The average value of the set sampling count is used. If the sample interval exceeds 5 seconds, the average value of data obtained in a sub-sample (5 seconds) is used.

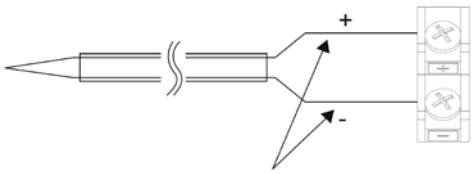
DC voltage input



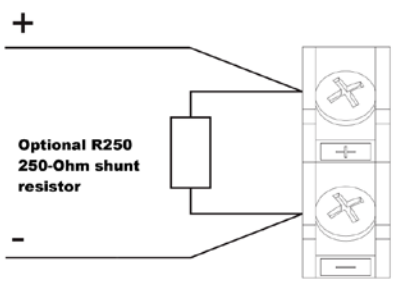
RTD input



Thermocouple input

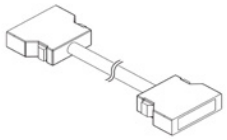


4-20 mA process current input



GL840 Analog Channel Expansion

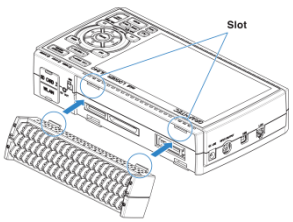
The included base analog channel count of 20 channels can be expanded in 20-channel increments to a total of 200, and the GL840 supports various options to accomplish this. At a minimum you'll need one of two types of Terminal Units, an Extension Terminal Base Unit, and at least one of two cables. The expansion process begins by removing the GL840s included Terminal Unit. Next, the removed Terminal Unit is attached to a Extension Terminal Base Unit and paired with one or more other assemblies depending upon the desired analog channel count. The assemblies are cabled back to the GL840 to complete the expansion.

Item	Description
	Model B-564 Standard Terminal Unit. This is the 20-channel Terminal Unit that ships with model GL840-M. It supports a maximum common mode voltage of 60 Vp-p, and a typical voltage and temperature accuracy of ±0.1% FS and ±1.55°C respectively.*
	Model B-565 High CMV Terminal Unit. This is the 20-channel Terminal Unit that ships with model GL840-WV. It supports a maximum common mode voltage of 300 Vp-p, and a typical voltage and temperature accuracy of ±(0.05% FS + 10 µV) and ±1.1°C respectively.*
	Model B-566 Extension Terminal Base Unit. Provided with a joiner plate and screws to mechanically attach it to others, the Extension Terminal Base Unit is required to externally mount either the B-564 or B-565 Terminal Units.
	Model B-567-05 or B-567-20 Connection Cable. This connection cable is offered in either 50 cm (-05) or 2 m (-20) lengths and connects the B-566 to the GL840 mainframe or to other B-566 units.

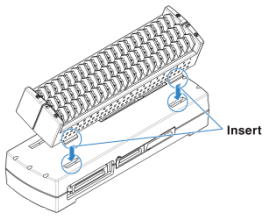
* The standard and high CMV terminals may be combined, but the CMV specification of the standard terminal is applied to all channels.

GL840 Expansion Steps

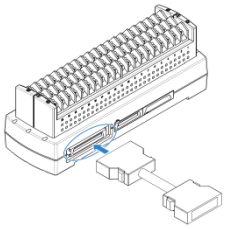
1. Remove exisiting Terminal Unit



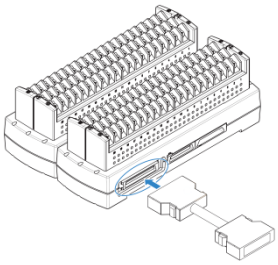
2. Attach Terminal to Base unit



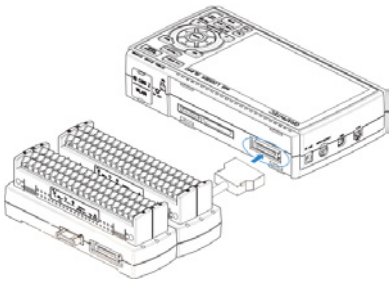
3. Attach Connection Cable to Base unit



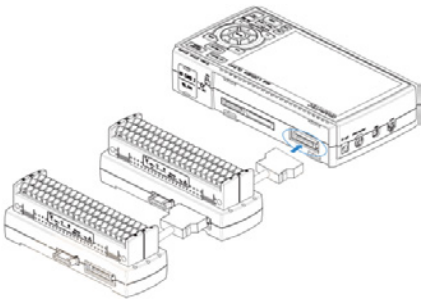
4. Join more expanders (10 units max.)



5. Connect to the GL840

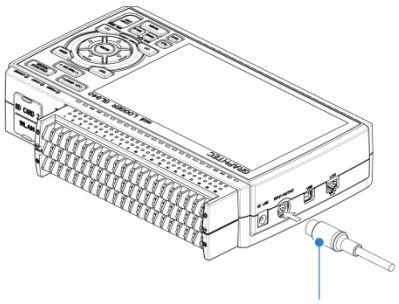


6. Add cables as desired (20m total max.)



GL840 Discrete I/O and Pulse Inputs

Depending upon the application, discrete I/O and pulse inputs can play a crucial data logging role. The GL840 supports four discrete alarm outputs that can signal alarm or event states that are a function of virtually any combinations of analog and pulse or discrete input values. These alarm outputs may be used to handshake with a PLC or other devices to start or stop processes or simply signal the beginning or end of events. The GL840 also offers four discrete input ports, which may be configured as simple binary true/false input flags, or for pulse and counter inputs. Pulse inputs can be used to acquire frequency data such as rpm or flow, or reconfigured to acquire count data to derive volume from flow or simply count the number of iterations from a process. Pulse data is neatly folded into acquired analog data so that all measured parameters can be evaluated in the same timeframe during analysis to easily identify cause and effect. A final discrete input is reserved for externally triggering the GL840's A-D conversion to allow the instrument to synchronize to external processes. Access to all discrete I/O requires the B-513 cable option.



Input/out put cable for GL (B-513: Option)

Logic/Pulse Input Specifications

Item	Description
Number of input channels	4 (switch between logic and pulse)
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	Approx. +2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)

Trigger Input/External Sampling Input Specifications

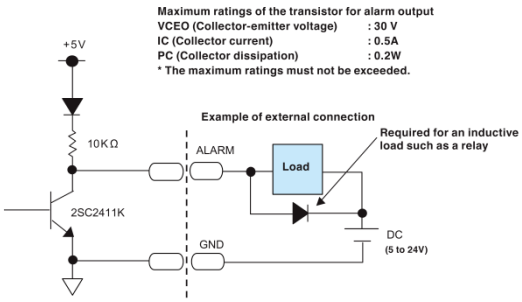
Item	Description
Number of input channels	1
Input voltage range	0 to +24V max. (single-ended ground input)
Threshold level	Approx. +2.5V
Hysteresis	Approx. 0.5 V (+2.5 to +3 V)

Alarm Output Specifications

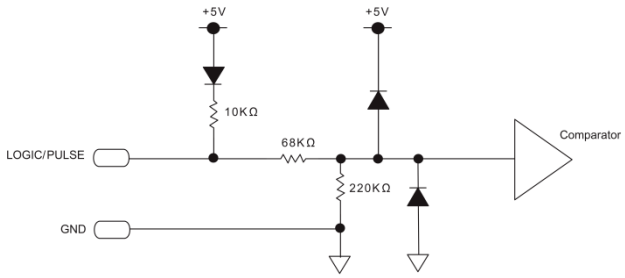
Item	Description
Number of output channels	4
Output format	Open collector output +5 V, 10 KΩ pull-up resistance

Discrete I/O Instrument-side Equivalent Circuits

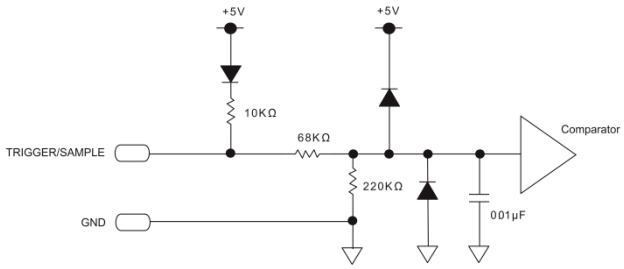
● **Alarm output**



● **Logic/Pulse input**



● **Trigger input/External sampling input**

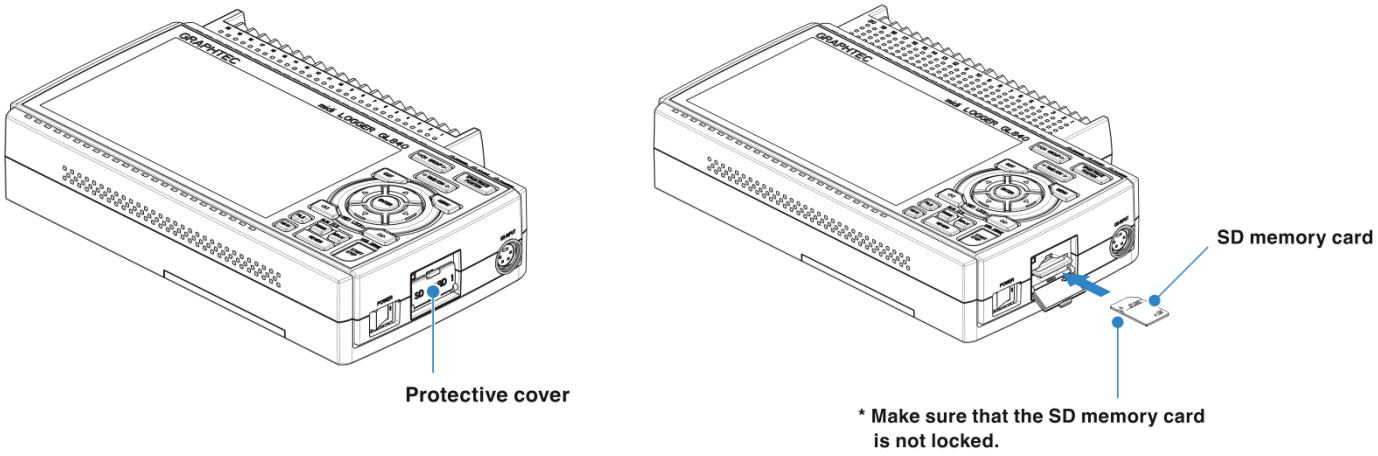


SD Memory Card and Wireless Option Access

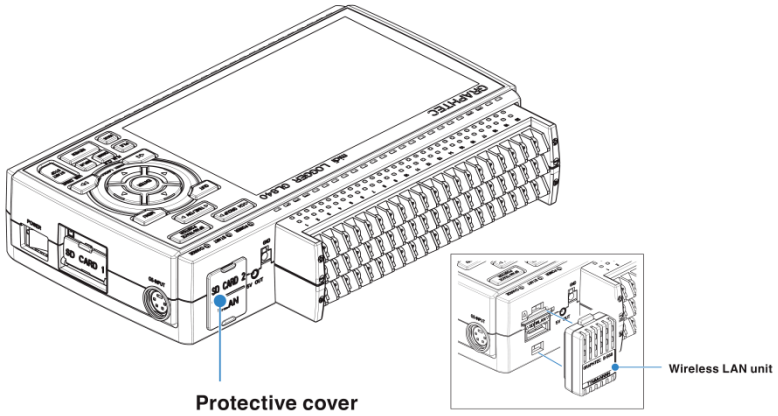
The GL840 supports two SD memory slots. SD Card 1 is provided with a 4 GB SD memory for data recording. Any SDHC memory card can be used to a 32 GB capacity. SD Card 2 can be populated with a secondary SD memory card, or with the B-568 wireless option. Model B-568 enables the networking features of the GL840, and its installation in a secondary SD slot without affecting the primary SD slot does not compromise the GL840's storage capacity. The wireless option supports IEEE 802.11b/g/n with the following security protocols: WEP64, WEP128, WPA-PSK/WPA2-PSK, AKIP/AES. The B-568 wireless option may be configured as either an access point to allow peer-to-peer communication (such as with the GL100-WL data logger option), or as a router-managed device on a LAN.

SD Memory and B-568 Wireless Access

Inserting the SD memory into SD Card1 Slot



SD Card2 Slot and Wireless Installation



Programmable Sampling Interval Speed versus Measurement

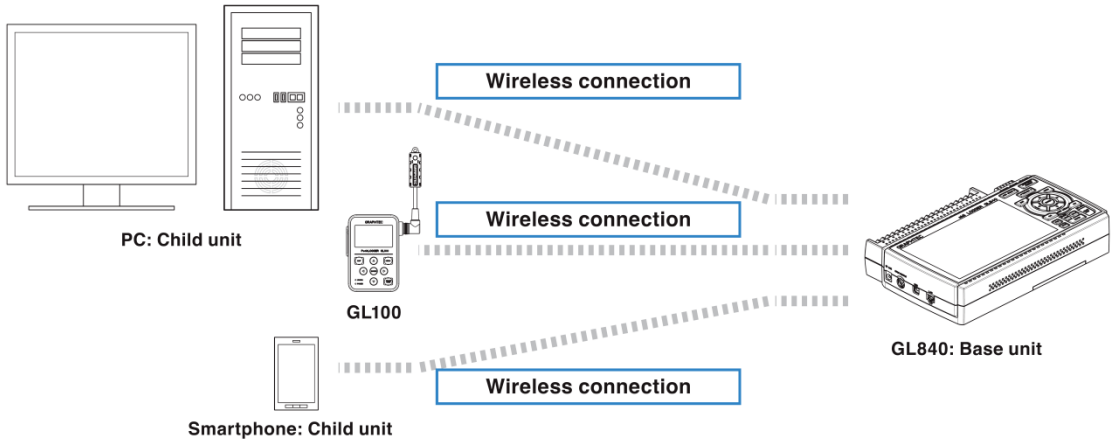
Interval		10mS	20mS	50mS	100mS	200mS	500mS	1S	2S	>2S
Number of channels		1	2	5	10	20	50	100	200	200
Measure-ment	Voltage	Yes								
	Temperature	No			Yes					

(Chart applies when the captured data format is binary. Limited sampling speed when GL100-WL sensors are in use.)

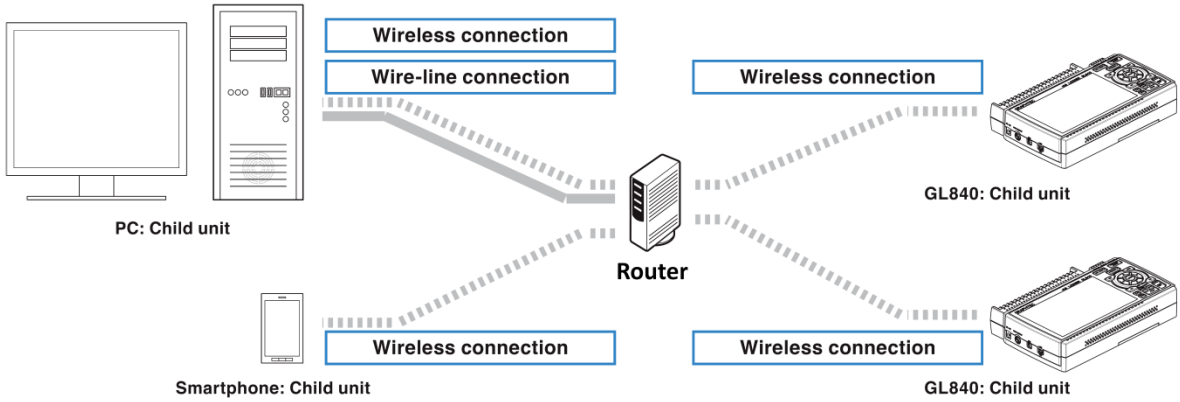
B-568 Wireless Option Networking Modes

Use the B-568's access point mode to network the GL840 with the optional GL100-WL (up to 5 units) to expand measurement flexibility, or to provide direct peer-to-peer access to a PC and even a smart phone. Alternatively, the B-568's router mode neatly folds the GL840 into an existing LAN. The B-568 wireless option or hard-wired Ethernet enables an entire upper level of GL840 performance in terms of FTP backup, Web server operation, and email notification. Web server mode supports all popular Web browsers and allows remote operation of the GL840 and real time screen monitoring.

As a Wireless Access Point



As a Router-managed Device

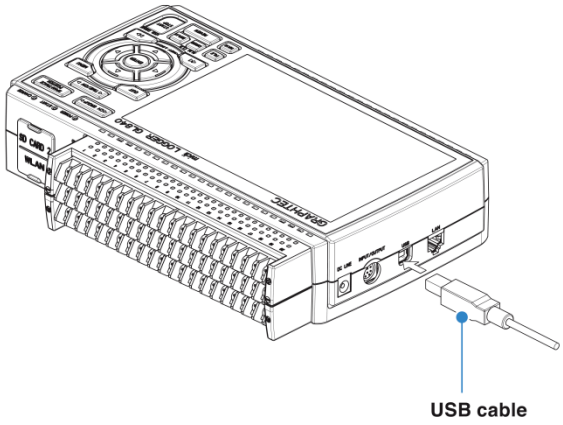


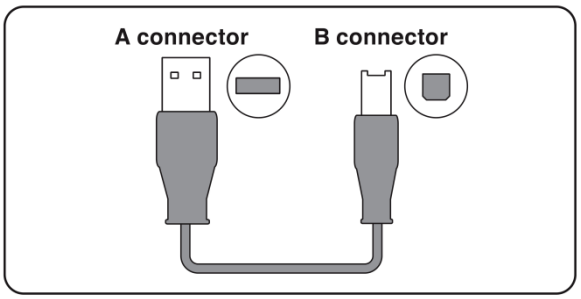
E-mail Configurations

Selection item		Description
E-mail address	TO:	Set the e-mail address of the e-mail destination. (Up to 63 characters)
	CC1: to CC3:	Up to three e-mail addresses can be set as CC (carbon copy). (Up to 63 characters)
	Subject:	The e-mail subject. (Up to 63 characters)
Notification	Alarm	When it is set to On, the occurrence of alarm is notified.
	Low battery	When it is set to On, the low battery information is notified.
	Low communication strength	When it is set to On, the low communication strength information is notified.
	SD memory card free space	When it is set to On, the SD memory card free space information is notified.
	Periodic notification	Set the time to send the notification setting information with the e-mail to any address.

Connecting the GL840 Directly To A PC

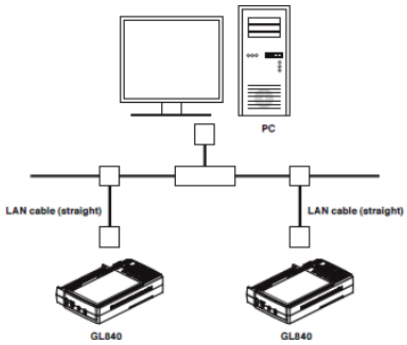
Don't need a wireless or hard-wired LAN? No problem. The GL840's integral USB port allows it to connect directly to a PC on to which is typically installed the included Graphtec APS software for real time data acquisition.

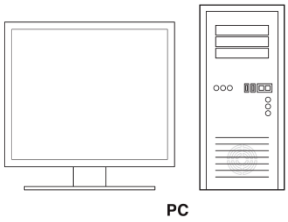


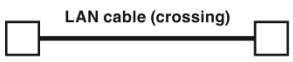


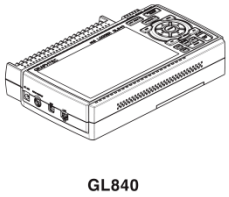
Ethernet Connection

Use a crossover cable when connecting the GL840 directly to a PC. Otherwise, a standard Ethernet cable can be used.



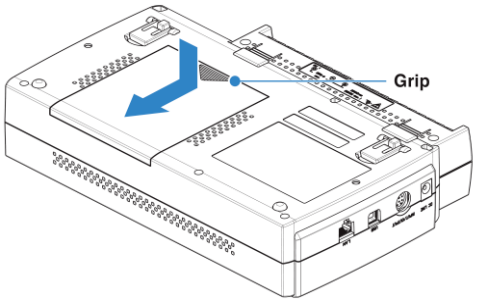


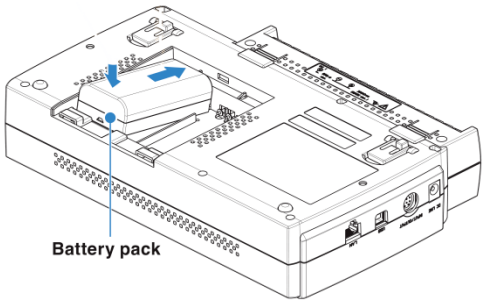




Internal Battery Pack Option B-569

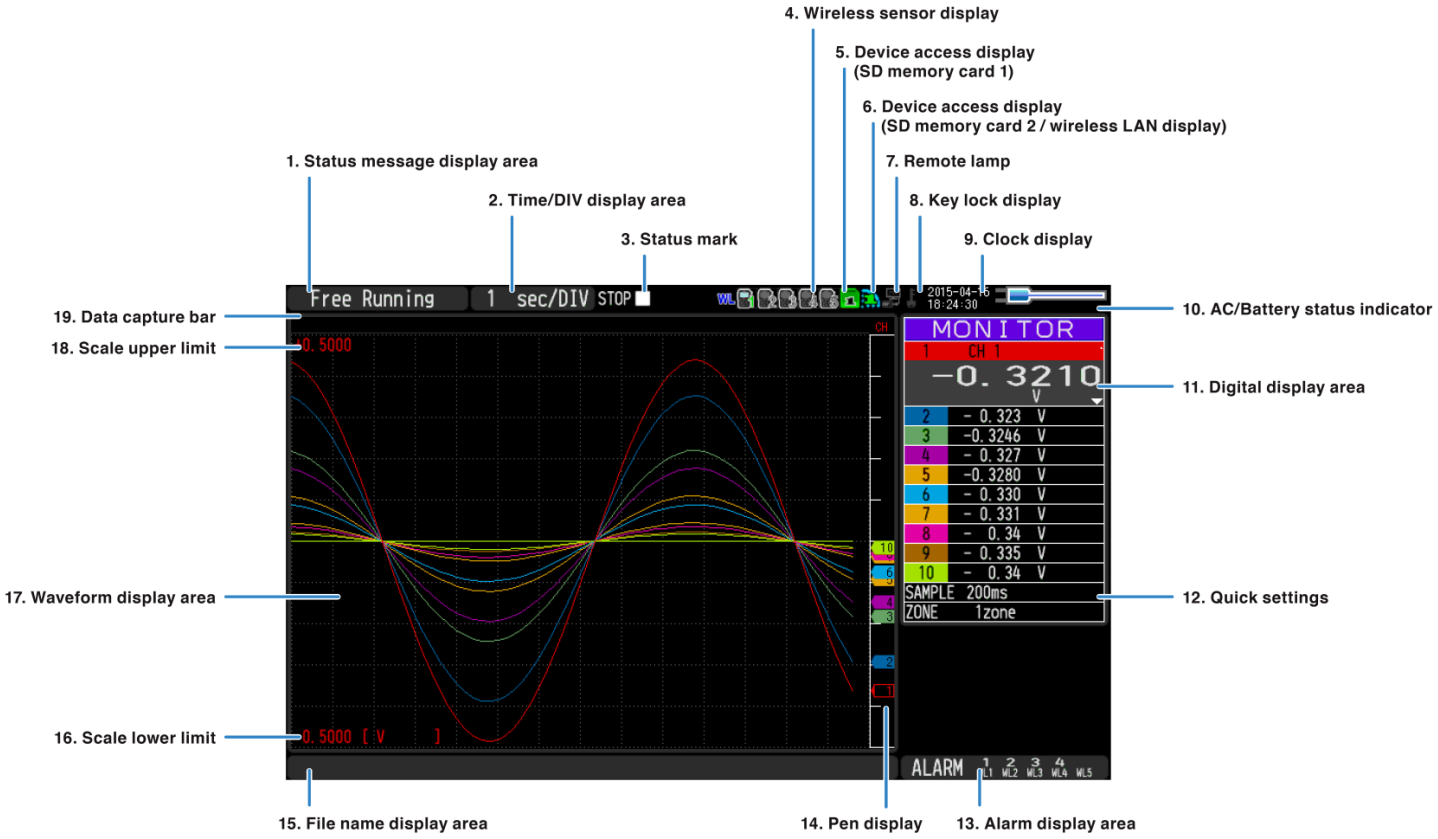
The GL840 supports one or two battery packs, option (B-569), that allows operation independent of ac power. A fully charged battery allows an operating time of 5 hours (one battery pack) to 10 hours (two battery packs) depending upon data logging configuration. The battery can also operate as a UPS (uninterruptable power supply.) In the event that ac power is lost, the GL840 will seamlessly continue operation on battery power without data logging disruption.

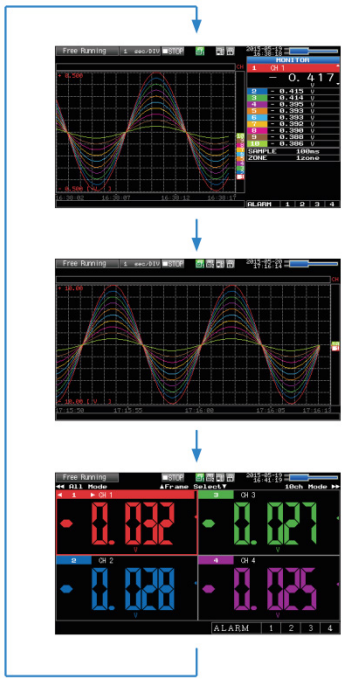




GL840 Display Close Up

The GL840's 7-inch display shows acquired analog and discrete/pulse data in real time as it is acquired. Values can be scaled into meaningful engineering units, and one of three selectable modes can displayed with a simple button push.





Waveform and digital screen

Expanded waveform screen

Digital display screen

GL840 Analog Measurement Modes

The GL840 in tandem with the optional GL100-WL wireless add-on or its GS Sensor accessories is capable of a remarkable range of measurements. Measurements that the GL840 can make on its own are voltage, 4-20 mA process current (with optional R250 shunt resistor), thermocouple, RTD, and humidity (with optional B-530 sensor.) When a GL100-WL is added to the mix (requires the optional B-568 wireless interface), the GL840 has wireless access to an additional range of measurements. Without the wireless option or the GL100-WL, the GL840 directly accepts GS Series add-on modules.

Direct GL840 Measurements

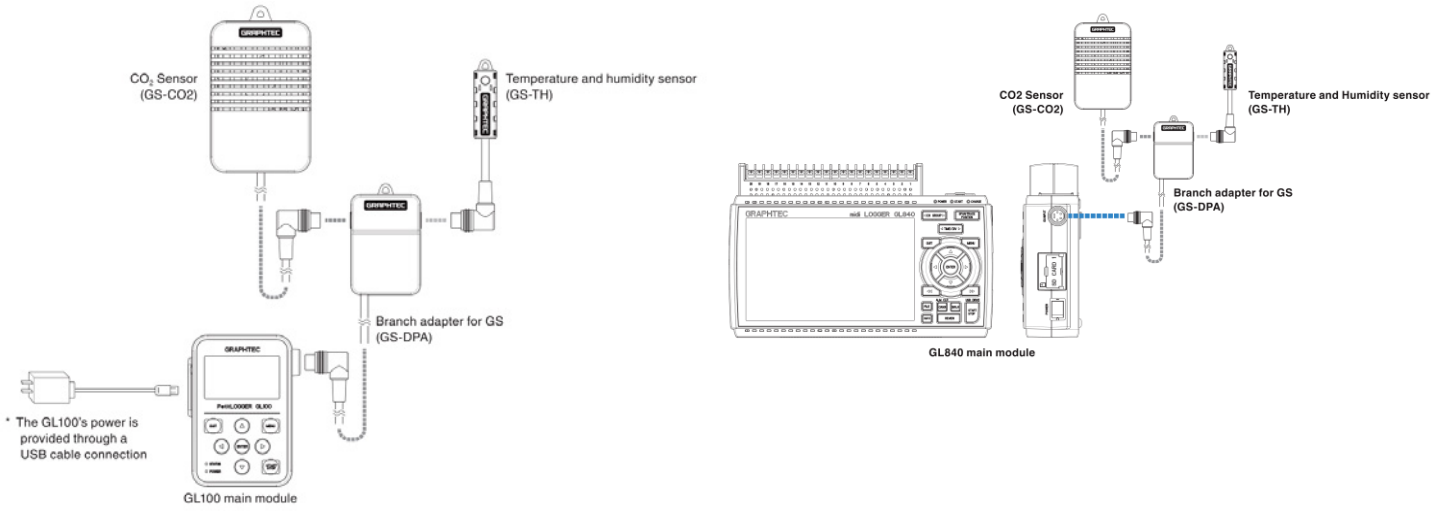
Function	Channels	Measurements	Comments
Analog	20 (expandable to 200)	Voltage	±20 mV to ±100 V
		Thermocouple	Types K, J, E, T, R, S, B, N, W (WRe 5-26)
		4-20 mA	Requires R250, 250-Ohm current shunt
		Humidity	Requires B-530 humidity sensor option
		RTD	3-wire PT100, PT1000
Discrete	4	Logic	True/false
		Pulse	Count, instantaneous count, revolution

GL100-WL Add-on Modules (refer to the GL100 Accessories datasheet for details)

Model	Channels	Measurements	Alarms	Comments
GL100-WL	-	-	1*	Provides wireless access to the GL240
GS-TH	4	Ambient temperature and RH	-	
GS-3AT	4	Temp + 3-axis acceleration	-	
GS-4VT	4	Thermocouple/voltage	-	Programmable per channel. Supports K and J TCs
GS-4TSR	4	Thermistor	-	
GS-LXUV	4	Illuminance / Ultraviolet	-	
GS-CO2	1	CO_2	-	
GS-DPA-AC	4	AC current sensor (1 or 3 phase)	-	
GS-DPA	-	Dual branch adator	-	Used to combine (pair) the indicated modules
	8	GS-TH + GS-LXUV	-	
	5	GS-TH + GS-CO2	-	
	5	GS-CO2 + GS-LXUV	-	

* GS modules support a level alarm function that is detected by the GL100-WL and communicated to a wireless-equipped GL840.

Use GS Series Add-ons Wirelessly with a GL100-WL, or Directly Connected



GL840 Global Device Measurement Settings

The GL840 allows an array of settings that define how all of its channel information is acquired. The following table provides a overview of the major setting categories and selections within them:

Measurements		Comments
Sampling		10, 20, 50, 100, 125, 200, 250, 500ms, 1, 2, 5, 10, 20, 30s, 1, 2, 5, 10, 20, 30min, 1h; External
Capture destination		SD CARD 1, SD CARD 2
	File Name	Name of the recorded data file
Ring/Relay capture		Off, Ring, Relay
	Ring capture	Number of recording points
AC Line Filter		Off, On
Backup	Backup Interval	Off, 1, 2, 6, 12, 24 hours
	Backup Destination	SD CARD 1 (SD1), SD CARD 2 (SD2), FTP
	Save Folder	Folder name
Calc. Settings 1		Off, Average, Max, Min, Peak, RMS
Calc. Settings 2		Off, Average, Max, Min, Peak, RMS

"Ring Capture" and "Relay Capture" Explained

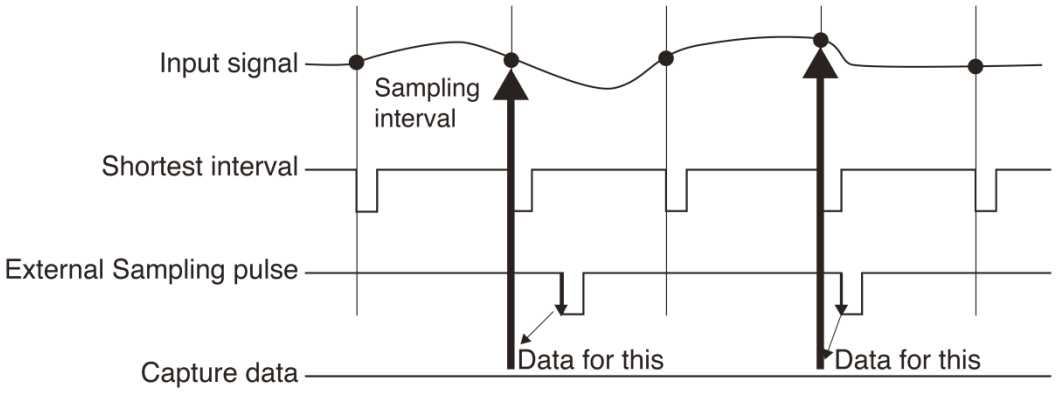
In addition to continuous data logging, the GL840 supports two special-purpose recording modes: Ring and Relay Capture.

The Ring Capture feature allows the GL840 to acquire a definable number of data values to consecutive data files while automatically deleting the oldest file. For example, if 1,000 data points are specified, data is acquired to File 1 until 1,000 data values have been recorded. Recording then seamlessly continues to File 2 for another 1,000 values. Before data recording continues to File 3 for another 1,000 data values, File 1 is deleted. When File 3 is full, File 2 is deleted and recording continues to File 4. This process continues until recording stops. In this manner Ring Capture allows data logging to continue indefinitely without concern for filling the target memory. Further, since the number of data values recorded to each file and sampling interval are definable and constant, the timeframe before data is erased is precisely known in advance. Thus, all critical data leading up to, during, and after an event can be captured for analysis. Maximum file size is 2 GB, but SD memory sizes as large as 32 GB are supported.

The Relay Capture feature of the GL840 is almost identical to Ring Capture, except that data files are never deleted. The feature essentially exchanges unlimited record time for an entire history of recorded data. Like Ring Capture, maximum file size is 2 GB, but SD memory sizes as large as 32 GB are supported.

"External Sampling" Explained

Sometimes asynchronous sampling rates just won't do. If you need to acquire data at a precise moment that's coincident with an event, and you can generate a trigger signal for that occurrence, External sampling can be used. The following diagram describes the timing relationship between the various components that define an externally triggered application.



Start or Stop Recording on Any Trigger Condition

The GL840's range of stop and start trigger conditions is massive and unrivaled. Select from single or windowed levels to the day and time of the week with everything in between per pulse or analog channel. Want to start or stop acquiring data when the signal level on channel 1 is above 200 psi, but only on Saturday at 12 noon? No problem. Finally, select Boolean AND/OR operators to tie any variety of trigger conditions together.

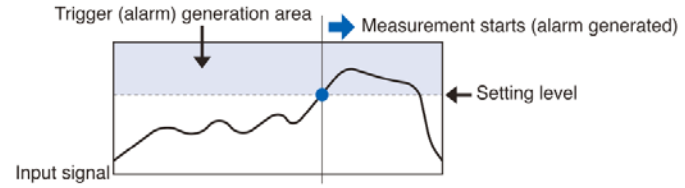
Finally, trigger conditions can be independently set for the GL840's alarm output ports as a function of virtually any combination of analog or pulse input values. The following table describes the array of GL840 trigger conditions to stop, start, or alarm the instrument:

Setting			Selections available
Start Side Source Setting			Off, Level, Alarm, External Input, Date, Weekly, Time
	[Level]	Mode	Analog: Off, H, L, Window In, Window Out Logic: Off, H, L Pulse: Off, H, L, Window In, Window Out
		Combination	Level OR, Level AND, Edge OR, Edge AND
		Level	Set numeric value
	[Alarm]	Alarm port number	1, 2, 3, 4, WL1
	[Date]	Date	From 2005.1.1 to 2035.12.31
		Time	From 0:0:0 to 23:59:59
	[Weekly]	Day of week	Off or On setting for each of Sunday through Saturday
		Time	From 0:0:0 to 23:59:59
	[Time]		From 0:0:1 to 9999:59:59
Stop Side Source Setting			Off, Level, Alarm, External Input, Date, Weekly, Time
	[Level]	Mode	Analog: Off, H, L, Window In, Window Out Logic: Off, H, L Pulse: Off, H, L, Window In, Window Out
		Combination	Level OR, Level AND, Edge OR, Edge AND
		Level	Set numeric value
	[Alarm]	Alarm port number	1, 2, 3, 4, WL1
	[Date]	Date	From 2005.1.1 to 2035.12.31
		Time	From 0:0:0 to 23:59:59
	[Weekly]	Day of week	Off or On setting for each of Sunday through Saturday
		Time	From 0:0:0 to 23:59:59
	[Time]		From 0:0:1 to 9999:59:59
Repeated Capturing			Off, On
Alarm Level Settings	Mode		Analog: Off, H, L, Window In, Window Out Logic: Off, H, L Pulse: Off, H, L, Window In, Window Out
	Level		Set numeric value
	Output		1, 2, 3, 4, WL1
	Detection Method		Level, Edge
	Alarm Hold		Held or Not held
	Send Burnout Alarm		Sent or not sent

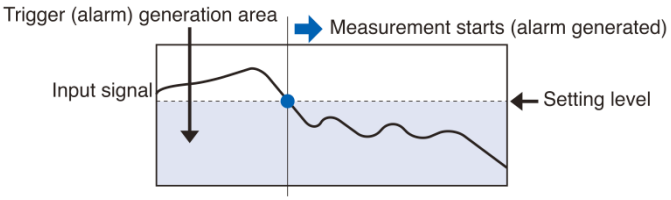
Trigger Operations Close Up

Trigger and Alarm Operations

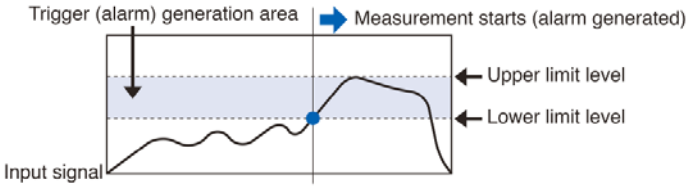
Rising



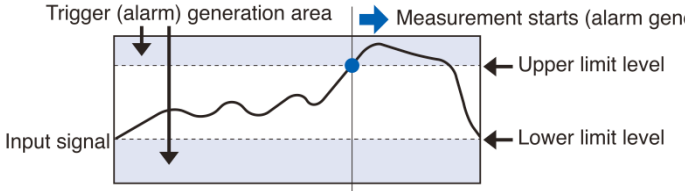
Falling



Window-in



Window-out



General Record Time

The following record time table assumes analog channels only with Logic/Pulse inputs disabled. Figures are approximate. File size of captured data is 2GB in GBD or CSV file format. Sampling interval is limited by the number of channels in use.

	Sampling Interval (10 acquired channels)						
Storage Format	10mS	50mS	100mS	200mS	500mS	1S	10S
Binary	31 days	77 days	95 days	108 days	270 days	>365 days	>365 days
CSV	3 days	11 days	16 days	21 days	54 days	109 days	>365 days

GL840 Specifications

Overall Specifications

Number of analog inputs: Maximum 200ch available for 20ch/1 terminal or extension unit

Analog terminal unit type: Standard terminal or High CMV, High-precision terminal unit (B-565)

GS sensor and terminal/ adapter connection terminal: One module
Optional (GS sensor and terminal / adapter) connections only

Data backup functions: Setup conditions: EEPROM; Clock: Lithium battery

Clock accuracy: (23°C environment) ±0.002% (accurate within about 50 seconds per month)

Operating environment: 0 to 45°C, 5 to 85% RH
(0 to 40°C when operated in batteries/15 to 35°C when battery is charging)

Withstand voltage: Standard terminal: Between each input ch and GND terminal: 350Vp-p 1 minute; Between each input terminals: 350Vp-p 1 minute
High CMV, High-precision terminal unit (B-565): Between each input ch and GND terminal: 2300VACrms 1 minute; Between each input terminals: 600Vp-p

Power supply: AC adapter : 100 to 240 VAC, 50 to 60 Hz
DC input : 8.5 to 24 VDC (26.4 V max.)
Battery pack (option) : 7.2 VDC (2900 mAh), two packs can be mounted

Power Consumption: AC Power consumption (when AC adapter is used)

Condition	Normal Consumption	Consumption during battery recharge
LCD on	24 VA	38 VA
Screensaver on	19 VA	33 VA

DC Power consumption

DC Voltage	Condition	Normal Consumption	Consumption during battery recharge
+24V	LCD on	0.36 A	0.65 A
+24V	Screensaver on	0.27 A	0.56 A
+12V	LCD on	0.70 A	Can't Recharge
+12V	Screensaver on	0.50 A	Can't Recharge
+8.5V	LCD on	1.00 A	Can't Recharge
+8.5V	Screensaver on	0.70 A	Can't Recharge

*Set the LCD to "Bright" as normal condition.

External Dimensions: Standard terminal: 240×158×52.5mm*
High CMV, High-precision terminal unit (B-565): 240×166×52.5mm*
*Not including protruding parts

Weight: Standard terminal: 1010g*
High CMV, High-precision terminal unit (B-565): 1035g*
*AC adapter and battery are not included, but one terminal unit is included

Vibration-tested conditions: Equivalent to automobile parts Type 1 Category A classification

Memory devices

Memory capacity: SD CARD Slot: 2 (Compatible with SDHC, up to approx. 32GB memory available)
• Approx. 4GB SD memory card included
• Possible to save up to 2GB for one file

Memory contents: Setup conditions, Measured data, Screen copy

PC I/F

Interface types: Ethernet (10BASE-T/100BASE-TX); USB 2.0; Wireless LAN (Option)

Functions: Data transfer to the PC (realtime, SD memory card data); PC control of the GL840; Control of wireless sensor GL100GL100-WL, Data capture (when connected to the wireless LAN: up to 5 units)

Ethernet functions: (10BASE-T/100BASE-TX) Web server functions: Displays the screen images
FTP server function: Transfer and delete the captured data in the SD memory card.
FTP client function: Back up the captured data to the FTP server.
NTP client function: Time-synchronize the NTP server.
DHCP client function: IP address automatic acquisition
DHCP client function : Automatically retrieves the IP address
E-mail function: Send and receive the e-mail

USB functions: USB drive mode: Transfer and delete the captured data in the SD memory card.

Realtime data transfer speed: 10 ms/1 ch maximum (dependant on number of channels).

Monitor

Display: 7-inch TFT color LCD (WVGA: 800 × 480 dots)

Displayed languages: Japanese, English, French, German, Chinese, Korean, Russian, Spanish

Backlight life: 50,000 hrs (until the brightness is reduced to 50%), varies with operating environment.

Backlight: Screen saver function provided (10, 30 sec., 1, 2, 5, 10, 30, 60 min.)

Input Unit Specifications for GL840-M (with B-564)

Number of input channels: 20ch (200ch available when used with the extension terminal base). Possible to direct-connect or connect with the extension terminal connection cable (sold separately) between the GL840 and terminal unit, or between terminal units.

Input terminal type: M3 screw type terminals (Rectangular flat washer)

Input method: Photo MOS relay scanning system
All channels isolated, balanced input
Terminal b to be used to connect the resistance temperature detector is shorted within all channels.

Scan speed: 10 ms/1 ch maximum

Measurement ranges: Voltage: 20, 50, 100, 200, 500 mV; 1, 2, 5, 10, 20, 50, 100 V; 1-5 V F.S.
Thermocouples : K, J, E, T, R, S, B, N, W (WRe5-26)
Resistance temperature detector: Pt100, JPt100, Pt1000 (IEC751)
Temperature range : 100°C, 500°C, 2000°C (150°F, 750°F, 3000°F)
Humidity: 0 to 100% (voltage 0 to 1 V scaling conversion) fixed (requires B-530)

Measurement accuracy: 23°C ±5°C; When 30 minutes or more have elapsed after power was switched on; Sampling 1 s/10 ch; Filter ON (10); GND connected

Voltage: 0.1% of F.S.
Temperature Thermocouple:

TC	Measurement Temperature Range (°C)	Measurement Accuracy (°C)
R/S	0 ≤ TS ≤ 100 100 < TS ≤ 300 R : 300 < TS ≤ 1600 S : 300 < TS ≤ 1760	±5.2 ±3.0 ± (0.05% of rdg +2.0) ± (0.05% of rdg +2.0)
B	400 ≤ TS ≤ 600 600 < TS ≤ 1820	±3.5 ± (0.05% of rdg +2.0)
K	-200 ≤ TS ≤ -100 -100 < TS ≤ 1370	± (0.05% of rdg +2.0) ± (0.05% of rdg +1.0)
E	-200 ≤ TS ≤ -100 -100 < TS ≤ 800	± (0.05% of rdg +2.0) ± (0.05% of rdg +1.0)
T	-200 ≤ TS ≤ -100 -100 < TS ≤ 400	± (0.1% o f rdg +1.5) ± (0.1% o f rdg +0.5)
J	-200 ≤ TS ≤ -100 -100 < TS ≤ 100 100 < TS ≤ 1100	±2.7 ±1.7 ± (0.05% of rdg +1.0)
N	-200 ≤ TS < 0 0 ≤ TS ≤ 1300	± (0.1% o f rdg +2.0) ± (0.1% o f rdg +1.0)
W	0 ≤ TS ≤ 2000	± (0.1% o f rdg +1.5)
Reference contact compensation accuracy		±0.5

* Thermocouple diameters T, K: 0.32 φ, others: 0.65 φ

GL840 Specifications (cont.)

Measurement Accuracy (cont.): Resistance temperature detector:

Type	Measurement Temperature Range (°C)	Applied Current	Measurement Accuracy (°C)
Pt100	-200 to 850 (FS=1050)	1mA	±1.0
JPt100	-200 to 500 (FS=700)	1mA	±0.8
Pt1000	-200 to 500 (FS=700)	0.3mA	±0.8

*3-wire system

Temperature Range:

Type	Temperature Range (°C F.S.)	Resolution	Measurement Range (°C)
R/S	100	0.01	0 to 100
	500	0.05	0 to 500
	2000	0.1	R: 0 to 1600 S: 0 to 1760
B	500	0.05	400 to 500
	2000	0.1	500 to 1820
K/E/T/J/N	100	0.01	-100 to 100
	500	0.05	K/E/J/N: -200 to 500 T : -200 to 400
	2000	0.1	K : -200 to 1370 E : -200 to 800 T : -200 to 400 J : -200 to 1100 N : -200 to 2000
W	100	0.01	0 to 100
	500	0.05	0 to 500
	2000	0.1	0 to 2000
Pt	100	0.01	-100 to 100
	500	0.05	-200 to 500
	2000	0.1	Pt100: -200 to 850 JPt100/Pt1000: -200 to 500

*Measurement accuracy does not change due to the temperature range

Reference contact compensation accuracy: Internal/External switching

A/D converter: Method:ΔΣ method; Resolution:16-bit (Effective resolution: About 1/40,000 of the +/- range)

Temperature coefficient: Gain : 0.01% of F.S./°C; Zero : 0.02% of F.S./°C (Occurs when sampling speed is 10, 20, or 50 ms.)

Input resistance: 1 MΩ ±5%

Allowable signal source resistance: Within 300Ω

Maximum permissible input voltage: Between +/– input terminals :20mV to 2V range (60Vp-p); 5V to 100V range (110Vp-p)
Between input terminal/input terminal :60 Vp-p
Between input terminal/GND :60 Vp-p

Withstand voltage: Between input terminal/input terminal : 350 Vp-p 1 minute
Between input terminal/GND : 350 Vp-p 1 minute

Insulation resistance: Between input terminal/GND : 50MΩ or more (at 500 VDC)

Common mode rejection ratio: 90 dB or more (50/60 Hz; signal source 300Ω or less)

Noise: 48 dB or more (with +/– terminals shorted)

Filter: Off, 2, 5, 10, 20, 40
Filter operation is on a moving average basis. The average value of the number of set samples is used. If the sample interval exceeds 30 seconds, the average value of data obtained in a sub-sample (30 seconds) is used.

Input Unit Specifications for GL840-WV (with B-565)

Number of input channels: 20ch (200ch available when used with the extension terminal base). Possible to direct-connect or connect with the extension terminal connection cable (sold separately) between the GL840 and terminal unit, or between terminal units.

Input terminal type: M3 screw type terminals (Rectangular flat washer)

Input method: Photo MOS relay scanning system
All channels isolated, balanced input
Terminal b to be used to connect the resistance temperature detector is shorted within all channels.

Scan speed: 10 ms/1 ch maximum

Measurement ranges: Voltage: 20, 50, 100, 200, 500 mV; 1, 2, 5, 10, 20, 50, 100 V; 1-5 V F.S.
Thermocouples : K, J, E, T, R, S, B, N, W (WRe5-26)
Resistance temperature detector: Pt100, JPt100, Pt1000 (IEC751)
Temperature range : 100°C, 500°C, 2000°C (150°F, 750°F, 3000°F)
Humidity: 0 to 100% (voltage 0 to 1 V scaling conversion) fixed (requires B-530)

Measurement accuracy: 23°C ±5°C; When 30 minutes or more have elapsed after power was switched on; Sampling 1 s/10 ch; Filter ON (10); GND connected

Voltage: ± (0.05% of F.S. + 10μV)
Temperature Thermocouple:

TC	Measurement Temperature Range (°C)	Measurement Accuracy (°C)
R/S	0 ≤ TS ≤ 100 100 < TS ≤ 300 R : 300 < TS ≤ 1600 S : 300 < TS ≤ 1760	±4.5 ±3.0 ±2.2 ±2.2
B	400 ≤ TS ≤ 600 600 < TS ≤ 1820	±3.5 ±2.5
K	-200 ≤ TS ≤ -100 -100 < TS ≤ 1370	±1.5 ±0.8
E	-200 ≤ TS ≤ -100 -100 < TS ≤ 800	±1.0 ±0.8
T	-200 ≤ TS ≤ -100 -100 < TS ≤ 400	±1.5 ±0.6
J	-200 ≤ TS ≤ -100 -100 < TS ≤ 100 100 < TS ≤ 1100	±1.0 ±0.8 ±0.6
N	-200 ≤ TS < 0 0 ≤ TS ≤ 1300	±2.2 ±1.0
W	0 ≤ TS ≤ 2000	±1.8
Reference contact compensation accuracy		±0.3

* Thermocouple diameters T, K: 0.32 φ, others: 0.65 φ

Resistance temperature detector:

Type	Measurement Temperature Range (°C)	Applied Current	Measurement Accuracy (°C)
Pt100	-200 ≤ TS ≤ 100 100 < TS ≤ 500 500 < TS ≤ 850	1mA	±0.6 ±0.8 ±1.0
JPt100	-200 ≤ TS ≤ 100 100 < TS ≤ 500	1mA	±0.6 ±0.8
Pt1000	-200 ≤ TS ≤ 100 100 < TS ≤ 500	0.3mA	±0.6 ±0.8

*3-wire system

Temperature Range:

Type	Temperature Range (°C F.S.)	Resolution	Measurement Range (°C)
R/S	100	0.01	0 to 100
	500	0.05	0 to 500
	2000	0.1	R: 0 to 1600 S: 0 to 1760
B	500	0.05	400 to 500
	2000	0.1	500 to 1820
K/E/T/J/N	100	0.01	-100 to 100
	500	0.05	K/E/J/N: -200 to 500 T : -200 to 400
	2000	0.1	K : -200 to 1370 E : -200 to 800 T : -200 to 400 J : -200 to 1100 N : -200 to 2000
W	100	0.01	0 to 100
	500	0.05	0 to 500
	2000	0.1	0 to 2000
Pt	100	0.01	-100 to 100
	500	0.05	-200 to 500
	2000	0.1	Pt100: -200 to 850 JPt100/Pt1000: -200 to 500

*Measurement accuracy does not change due to the temperature range

Reference contact compensation accuracy: Internal/External switching

GL840 Specifications (cont.)

A/D converter:	Method:ΔΣ method; Resolution:16-bit (Effective resolution: About 1/40,000 of the +/- range)
Temperature coefficient:	Gain : 0.01% of F.S./°C; Zero : 0.02% of F.S./°C (Occurs when sampling speed is 10, 20, or 50 ms.)
Input resistance:	1 MΩ ±5%
Allowable signal source resistance:	Within 100Ω
Maximum permissible input voltage:	Between +/– input terminals :20mV to 2V range (60Vp-p); 5V to 100V range (110Vp-p) Between input terminal/input terminal :600 Vp-p Between input terminal/GND :300 Vp-p
Withstand voltage:	Between input terminal/input terminal : 600 Vp-p 1 minute; Between input terminal/GND : 2300 VACrms 1 minute
Insulation resistance:	Between input terminal/GND : 50MΩ or more (at 500 VDC)
Common mode rejection ratio:	90 dB or more (50/60 Hz; signal source 300Ω or less)
Noise:	48 dB or more (with +/– terminals shorted)
Filter:	Off, 2, 5, 10, 20, 40 Filter operation is on a moving average basis. The average value of the number of set samples is used. If the sample interval exceeds 30 seconds, the average value of data obtained in a sub-sample (30 seconds) is used.

Function Specifications

Display screen:	Waveform + Digital screen, All Waveform screen, Digital + Calculation Display screen, Expanded digital screen * Can be switched using the dedicated key (toggle operation) * For the Expanded Digital screen, the number of channels and the display channel must be specified * The waveform is not rewritten due to the change of the TIME / DIV.
Sampling interval:	10 ms/1 ch maximum (GBD/CSV-formatted) 10, 20, 50, 100, 125, 200, 250, 500 ms; 1, 2, 5, 10, 20, 30 sec.; 1, 2, 5, 10, 20, 30 min.; 1 hour; External * The settings of 125 ms or below can be used depending on the input settings and the measuring channel.
EU (scaling function):	4 points can be set for each channel The temperature range scaling function is available.
Functions during capture:	Confirmation of the captured data; Saving of data between cursors; Replacement of the SD memory card * When the wireless sensor (GL100-WL) is connected, the sample interval among 10, 20, and 50ms cannot be replaced during recording.
Data save function:	Capture destination: SD memory card (Available both slot 1 and 2) Captured data: Settings, Screen data, Measurement data
Capture function:	Function: OFF, Ring recording, Relay recording
Ring recording:	Number of recording points: 1000 to 2000000 When ring capture is ON, the memory space that can be used for capture is one-third of the free space.
Relay recording:	The data is continuously recorded in 2GB-separated files without missing data.
Replaying data:	GBD/CSV-formatted data file (only data captured in this GL840)
Calculation between channels:	Calculation type: Four arithmetic operations (+, -, ×, ÷) Target input: Analog CH1 to CH200 GS sensor and terminal/adapter: CH1 to CH8 Wireless sensor: CH1-1 to CH5-8
Statistical calculation:	Statistical calculation type: Average value, peak value, maximum value, minimum value, root mean square value; Number of calculations: Two arithmetic operations can be set to each channel; Calculation method: Real-time calculation and specified between cursors (during replay) * Real-time calculation results are displayed on the Digital screen + Calculation Display screen.
Search functions:	Function : Search the captured data for the required number of points Search type : Channel Pulse, Logic, Level, Alarm search
Annotation input function:	Function : A comment can be entered for each channel Input table characters : Alphanumerics Number of characters : 31 (The number of characters can be displayed on the screen is up to eight characters.)
Navigation function:	Easy capture measurement, easy trigger setting, wireless LAN setting functions

Trigger/Alarm Functions

Repeat Trigger:	Off, On
Trigger types:	Start: Data capture starts when a trigger is generated; Stop: Data capture stops when a trigger is generated
Trigger conditions:	Start: Off, Level, Alarm, External, Time Stop: Off, Level, Alarm, External, Time
Trigger judgment modes:	Combination: Level OR, Level AND, Edge OR, Edge AND; Analog channel judgment mode: H (↑), L (↓), Window In, Window Out; Logic channel judgment mode: H (↑), L (↓); Pulse channel judgment mode: H (↑), L (↓), Window In, Window Out
Alarm judgment modes:	Combination: Analog, Logic or "AND" / "OR" of pulse; Analog judgment: H (↑), L (↓), Window In, Window Out; Logic judgment: Pattern; Pulse judgment: H (↑), L (↓), Window In, Window Out

External Input/Output Functions

Input/output types:	Trigger input (1 ch) or External sampling input (1 ch) Logic input (4 ch) or Pulse input (4 ch) Alarm output (4 ch) * Switch between Logic and Pulse * Switch between Trigger and External sampling. * The Input/output cable for GL B-513 (option) is required to use the external output function.
Input specifications:	Input voltage range : 0 to +24 V (single-ended ground input); Input signal : No-voltage contact (a-contact, b-contact, NO, NC), Open collector, Voltage input; Input threshold voltage : Approx. +2.5 V; Hysteresis : Approx. 0.5 V (+2.5 to + 3 V)
Alarm output specifications:	Output format: Open collector output (5 V, pull-up resistance 10KΩ)) <Maximum ratings of output transistor> • Collector-GND voltage : 30 V • Collector current : 0.5 A • Collector dissipation : 0.2 W Output conditions: Level judgment, window judgment, logic pattern judgment, pulse judgment
Pulse input:	Revolutions mode (engines, etc.): Counts the number of pulses per sampling interval, and converts them to RPM. Set the number of pulses per revolution during revolution. Spans : 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M PRM/F.S. Counts mode (electric meters, etc.): Counts the number of pulses for each sampling interval from the start of measurement. Spans : 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M C/F.S.

GL840 Specifications (cont.)

Pulse input (continued):	Inst. mode: Counts the number of pulses for each sampling interval. Resets the count value after each sampling interval. Spans : 50, 500, 5000, 50 k, 500 k, 5 M, 50 M, 500 M C/F.S. Maximum input frequency : 50kHz Maximum number of count : 50kC/sampling (16-bit counter)
Connectable sensor, terminal, adapter: (Generic name: GS sensor and terminal/adapter)	Number of GS sensors and terminals/adapter connection terminals: 1 GS-TH: Temperature and humidity sensor GS-4TSR: 4CH thermistor terminal GS-LXUV: Illuminance / ultraviolet sensor GS-DPA: Branch adapter for GS GS-DPA-AC: Adapter for AC current sensor GS-CO2: CO2 sensor GS-3AT: 3-axis acceleration / temperature sensor GS-4VT: 4CH voltage / temperature terminal * The items above are optional accessories. Sampling: 500 ms to 1 hour * Specific setting is not required. It is synchronized to the setting of the GL840.

Control Software

Compatible OS:	Windows8.1/Windows8/Windows7/Windows Vista
Function:	Main unit control, realtime data capture, data conversion
Number of groups:	4 groups MAX
Number of CHs per group:	Up to number of connected module
Max number of channels:	1000 ch maximun
Settings:	AMP settings, capture settings, trigger/alarm settings, report settings, others
Captured data:	Realtime data (CSV, GBD Binary) Data in SD memory card (CSV, GBD binary)
Display:	Analog waveforms, logic waveforms, pulse waveforms, digital values
Display modes:	Y-T View, Digital View, X-Y View between Cursors (only during replay)
File conversion:	Between cursors, All data
Monitor functions:	Alarm monitor enables sending of email to the specified address
Statistic/History:	Displays max, min and average values
Report function:	Enables creation of daily or monthly files
E-mail function:	E-mail sent to specified address on alarm

See ordering information on next page

Ordering Guide

Description	Order No.
GL840-M Compact, lightweight, multi-channel data logger with 20 analog measurement channels (expandable to 200), 20mV to 100V Full Scale measurement range, 4 discrete input channels, and 4 alarm outputs. Includes GL840 data logger, 4 GB flash memory card, AC adapter, software on CD, and an NIST-traceable calibration certificate.	GL840-M
GL840-WV Compact, lightweight, multi-channel data logger with 20 high common mode voltage analog measurement channels (expandable to 200), 20mV to 100V Full Scale measurement range, 4 discrete input channels, and 4 alarm outputs. Includes GL840 data logger, 4 GB flash memory card, AC adapter, software on CD, and an NIST-traceable calibration certificate.	GL840-WV

Accessories

Description	Order No.	Description	Order No.
Standard input terminal 20 channel input terminal.	B-564	**High CMV input terminal** 20 channel input terminal for high CMV.	B-565
Extension terminal base Base unit, connection plate, and screws.	B-566	**Extension terminal cable** 50cm extension connection cable.	B-567-05
Battery pack 7.2V/2900mAh lithium battery pack.	B-569	**Extension terminal cable** 2m extension connection cable.	B-567-20
DC Power Cable 2-meter DC power cable, bare tips.	B-514	**Humidity Sensor** 3-meter with dedicated power connector.	B-530
B-536-US-840 Carrying case.	B-536US-240	**Logic/Alarm Cable** 2-meter logic/alarm cable, bare tips.	B-513
R250 4-20mA shunt resistor.	R250	**Wireless Option** Wireless communication option. 802.11/b/g/n	B-568
GL100-WL Wireless GS series sensor coupler.	GL100-WL	**Power supply** Spare AC power supply.	GLACP
GS-4TSR GL100 terminal for thermistor temperature.	GS-4TSR	**GS-4VT** GL100 Voltage/thermocouple terminal.	GS-4VT
GS-103AT-4P GL100 3m thermistor sensor (-40 to 105°C).	GS-103AT-4P	**GS-3AT** GL100 sensor for acceleration and temperature.	GS-3AT
GS-103JT-4P GL100 3m thermistor sensor (-40 to 120°C).	GS-103JT-4P	**GS-DPA-AC** GL100 adapter for AC power measurements.	GS-DPA-AC
GS-CO2 GL100 Sensor for CO2	GS-CO2	**GS-AC50A** Dedicated 50A current transformer.	GS-AC50A
GS-LXUV GL100 Sensor illuminance/UV.	GS-LXUV	**GS-AC100A** Dedicated 100A current transformer.	GS-AC100A
GS-TH GL100 sensor for ambient temperature/RH.	GS-TH	**GS-AC200A** Dedicated 200A current transformer.	GS-AC200A
GS-DPA GL100 adapter for two sensors.	GS-DPA	**GS-EXC** 1.5m extension cable for GL100 sensors.	GS-EXC